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Consultants

FINAL REPORT
Amendment No. 1
Evaluation Methods and Procedures
Everglades Protection Program
Evaluation of Alternative Treatment Technologies

Contract C-3051

South Florida Water Management District

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CONTENTS

CHAPTER 1

INTRODUCTION

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INTRODUCTION

This task report documents the methodology and criteria to be used in evaluating alternative treatment technologies and on-farm best management practices (BMPs) for reducing phosphorus levels in agricultural drainage discharging into the Everglades Protection Area (EPA). The report is in fulfillment of the work authorized under Amendment No. 1 to Contract C-3051 between the South Florida Water Management District (District) and Brown and Caldwell Consultants (BCC) entitled Evaluation of Alternative Treatment Technologies, Everglades Protection Project.

BACKGROUND

In March 1992, the District's Governing Board adopted the Everglades Surface Water Improvement and Management (SWIM) Plan consistent with a Settlement Agreement between the United States, the Florida Department of Environmental Regulation, and the District. The primary objective of the SWIM Plan is to reduce phosphorus discharges in drainage waters from the Everglades Agricultural Area while maintaining suitable hydroperiod in the water conservation areas of the EPA. The strategy contained in the current SWIM Plan includes the following primary elements:

- The construction and operation of four Stormwater Treatment Areas (STAs), large scale constructed wetland treatment systems which will process storm runoff for the removal of nutrients.

- The initiation of a regulatory program having as its goal the reduction of present total phosphorus loads discharged from the Everglades Agricultural Area by 25 percent. That regulatory program is to include the development and implementation of BMPs by property owners in the Everglades Agricultural Area.

- The initiation and maintenance of a comprehensive, long-term, multi-agency research and monitoring program intended to:

  - Numerically define the applicable water quality standards.

  - Assess current and continuing responses of the Everglades Protection Area to nutrient input levels.

In approving the SWIM Plan, the District's Governing Board committed to minimizing economic impacts on the area by continuing to consider alternatives that could satisfy the mandated performance requirements of the Settlement Agreement and to amend the SWIM Plan if necessary. In April 1992, the District hired Brown and Caldwell to assist in the evaluation of alternative treatment technologies and BMPs for possible inclusion in the SWIM Plan in conjunction with the

wetland systems currently proposed. Development of the evaluation methodology and criteria documented in this task report is the first step in the alternatives evaluation process.

PURPOSE

The purpose of this report is to document a sound methodology for the evaluation of alternative treatment technologies and BMPs for application in the Everglades Agricultural Area prior to the initiation of any technical assessments or investigations. By so doing, it is believed that maximum objectivity can be maintained and that a fair and impartial evaluation of all available alternatives can be performed.

REPORT ORGANIZATION

This report is organized into four chapters. Chapter 2 provides an overview of the methodology and procedures to be used in evaluating the alternative treatment technologies and BMPs. Chapter 3 details the evaluation criteria to be used in performing a Phase I screening of alternative treatment technologies and how those criteria are to be applied. Chapter 4 discusses the criteria to be used in performing the more thorough Phase II evaluation of feasible treatment technologies.

CHAPTER 2

EVALUATION METHODOLOGY

CHAPTER 2

EVALUATION METHODOLOGY

This chapter discusses the methodology to be used in evaluating alternative treatment technologies and on-farm best management practices (BMPs) for control of agricultural drainage into the Everglades Protection Area. The various categories of evaluation criteria are presented and a numerical scoring system for rating of treatment alternatives is discussed.

EVALUATION OF ALTERNATIVE TREATMENT TECHNOLOGIES

The evaluation of alternative treatment technologies will be accomplished in two phases. The Phase I evaluation will be broad and conceptual in scope and will be used to eliminate from further consideration those alternatives which cannot realistically meet the objectives of the SWIM Plan. The Phase II evaluation will involve a more comprehensive analysis of the alternatives using the results of the Phase I screening evaluation as input. Both phases of evaluation will involve rating of the alternatives using a numerical scoring system.

Phase I Evaluation

The Phase I evaluation will determine whether an alternative, as proposed, can contribute to satisfying the phosphorus reduction and hydroperiod restoration objectives of the SWIM Plan within the mandated time period and at reasonable cost. The analysis will focus on the demonstrated capabilities of the technologies proposed, how they will be implemented in the Everglades Agricultural Area, and the time and cost required to implement them. The evaluation will remain conceptual in nature and will rely primarily on performance and cost data available from proponents of the various technologies, as well as data and other information published in the literature.

The Phase I screening evaluation of alternative treatment technologies will be performed at four different scales of technology application: basin, sub-basin, individual farm, and point source. The purpose of evaluating each technology at the various scales of application will be to categorize potentially feasible technologies according to the size or treatment function that they are best suited for.

The Phase I screening evaluation will also be performed for three different levels of phosphorus removal efficiencies: 25 percent, 50 percent and 75 percent of the influent phosphorus estimated for each scale of application (estimates of influent phosphorus loadings and concentrations at each scale of application are to be provided by Burns & McDonnell). The purpose of evaluating each technology for the various removal efficiencies at each scale of application is to reduce the possibility of an otherwise attractive technology being screened out initially solely on the basis of it not being able to achieve the mandated phosphorus reduction objectives (50 ppb) on its own. In all, 12 separate and independent evaluations of each alternative treatment technology will be performed during Phase I. These will involve the three phosphorus removal levels in each of the four scales of application.

Evaluation Criteria. The Settlement Agreement between the United States, the South Florida Water Management District (SFWMD), and the Florida Department of Environmental Regulation (DER) set out specific objectives for the SWIM Plan. Among these are reducing phosphorus loads to the Everglades Protection Area and restoring a suitable hydroperiod there. Alternative technologies that are not capable of contributing to the satisfaction of those performance objectives within the time period mandated in the Settlement Agreement will be eliminated from further consideration for incorporation into the SWIM Plan.

Table 2-1 summarizes the Phase I evaluation criteria to be used in the initial screening of alternative technologies. Weighting factors reflecting the importance of the criteria in relation to one another for the purpose of screening of technologies are also identified. Descriptions of the criteria and how they are to be applied during the Phase I evaluation are presented in Chapter 3.

Table 2-1 Phase I Evaluation Criteria

Criterion	Criterion weighting
Phosphorus removal capability	3
Implementation schedule	2
Hydroperiod impact	2
Operational impact on C & SF Project	2
Permitting requirements	2
Previous application of technology	2
Capital cost	1
O&M requirements	1
Economic impacts	1

Numerical Scoring System. The Phase I evaluation will be used to determine whether or not an alternative technology should receive further evaluation and, if so, at what scale of application. This will require that comparisons be made between technologies on the basis of the evaluation factors, or criteria, identified above. These criteria are not all equally important to the initial assessment of which technologies are potentially feasible. A key element in the evaluation methodology, therefore, is the approach used to incorporate the relative importance of individual criteria into the Phase I screening evaluation process.

For this investigation, a numerical scoring system will be used to facilitate the comparison of technologies against the common set of evaluation criteria. The proposed scoring system has two components: technology rating and criterion weighting. Technology ratings are used to numerically compare alternatives according to a single criterion. Criterion weights are used to compare the importance of one criterion in relation to other criteria. Multiplying the technology rating for a

criterion by the weight of the criterion yields the score for that technology against that criterion. Addition of the scores for all criteria yields the total score for a technology.

Technology Rating. The Phase I evaluation criteria are designed to be used in a qualitative sense to judge the overall feasibility of a technology to assist in meeting the objectives of the SWIM Plan, based on the data and information that is currently available. The description of each criterion includes a range of conditions and characteristics, both positive and negative, and a proposed rating to be assigned accordingly. The ratings range from "10" for the most positive or favorable condition to "1" for the least positive or favorable condition. The ranges of conditions and proposed ratings are included with the descriptions of the individual Phase I evaluation criteria in Chapter 3.

Criteria Weighting. As noted above, assigning weights to individual evaluation criteria is a way to reflect the importance of one criterion in relation to the others. For the Phase I evaluation, individual criteria are assigned weighting factors of 3, 2, or 1 depending on their relative importance to the initial screening of alternative technologies. The weighting factors for each criterion are presented in Table 2-1. Phosphorus removal capability is the most important criterion in the screening process and is assigned a weighting factor of 3. All other criteria have lower weighting factors as indicated in the table.

Analysis of Technology Ratings. The total scores for the various technologies at each of the four scales of application (basin, sub-basin, farm, point source) and phosphorus removal levels (25, 50 and 75 percent) will be compiled and a comparative evaluation of the technology ratings will be made. For each scale of application, the several technologies with the highest ratings will be recommended for further evaluation in Phase II. Depending on how the ratings compare, the number of alternatives recommended for the different scales of application may vary. However, no less than two alternatives will be recommended for Phase II evaluation in each scale of application. Those technologies not recommended for Phase II evaluation at any scale of application will be eliminated from further consideration at the completion of Phase I.

Phase II Evaluation

The alternative treatment technologies remaining after the Phase I screening evaluation will be subjected to a more thorough and comprehensive evaluation in Phase II. In this phase of the evaluation, technology assessments will be made on the basis of capability to treat specific waste streams generated within the EAA. Detailed technology evaluations will be performed using waste streams from two different basins, a typical sugar cane farm, a typical vegetable farm, a typical municipal wastewater treatment plant, a typical package wastewater treatment plant, and a typical sugar mill. Waste stream characteristics will be defined using data contained in previous reports and additional data to be generated by Burns & McDonnell during ongoing investigations related to detailed design of the STAs.

The top rated technologies at the appropriate scale of application will be evaluated regarding their capability to treat each of the model waste streams. No less than two and no more than three technologies will be evaluated for treatment of any one model waste stream. Where conceptual

design has already been accomplished, as in the case of the proposed STAs, this information will be used as the basis for the assessment. Where such information is not existing, parameters for technology implementation will be developed as part of the Phase II evaluation to allow the necessary assessments to be made.

The Phase II alternative technology evaluation will be carried out using a broad range of economic and noneconomic criteria. These criteria are identified below and are discussed in Chapter 4. The criteria will be used in conjunction with a numerical scoring system to rate the technologies for comparative evaluation purposes. The most attractive technologies for each specified waste stream will be recommended for site-specific investigation in a subsequent phase of work.

Evaluation Criteria. Technologies remaining after the Phase I screening process will be evaluated on a comparative basis for each specified waste stream using a comprehensive set of evaluation criteria. The Phase II evaluation criteria are subdivided into four categories: performance criteria, economic criteria, environmental criteria, and other criteria. Each category of criteria is further discussed below. The full set of evaluation criteria is summarized in Table 2-2. These criteria will be reviewed and refined, if necessary, following completion of the Phase I evaluation and prior to initiation of the Phase II evaluation.

Performance Criteria. Performance criteria are used to evaluate the capability of an alternative to contribute to the objectives of the SWIM Plan on a consistent basis over the long-term future. Two important criteria in this category are capability to reduce phosphorus concentrations to very low levels and to maintain hydroperiod in the Everglades. Other evaluation criteria in this category include implementation schedule, previous application of the technology, reliability, flexibility, and permitting requirements.

Economic Criteria. Economic criteria are used to compare the monetary cost of implementing the technologies being investigated. Four separate criteria will be included in the economic evaluation of alternatives: capital cost, operation and maintenance (O&M) cost, revenue loss due to agricultural land being taken out of production, and net present worth of all costs associated with implementation of a technology at the scale of application being considered.

Environmental Criteria. Improvement of water quality and restoration of suitable hydroperiod will enhance environmental conditions in the Everglades Protection Area. However, there are certain to be other resultant environmental impacts, both beneficial and adverse, associated with implementation of the various technologies at different scales. The evaluation criteria in this category allow comparison of technologies with respect to these secondary environmental effects. Criteria include impacts on fish and wildlife habitat, ground and surface water hydrology, downstream water quality, drinking water supply, and cultural and archeological resources. Also to be considered in the evaluation are flooding potential, and short-term construction impacts.

Other Criteria. Several other criteria, which do not fit into the three general criteria categories discussed above, will also be considered in the Phase II evaluation. These include land area requirements, operation and maintenance requirements, employment impacts, potential impacts

Table 2-2 Phase II Evaluation Criteria

Criterion	Criterion weighting
Performance criteria	
Phosphorus removal capability	10
Implementation schedule	8
Hydroperiod impact	6
Previous application of technology	5
Reliability	3
Flexibility	3
Permitting requirements	3
Subtotal, performance criteria	38
Economic criteria	
Capital cost	10
Operation and maintenance cost	5
Revenue loss	5
Present worth	15
Subtotal, economic criteria	35
Environmental criteria	
Habitat value	6
Downstream water quality	4
Drinking water supply	4
Ground and surface water hydrology	2
Impact on C & SF Project	1
Energy utilization	1
Cultural and archeological resources	1
Construction impacts	1
Subtotal, environmental criteria	20
Other criteria	
Land area requirements	2
Operation and maintenance requirements	2
Employment	1
Public health and safety	1
Local resource availability	1
Subtotal, other criteria	7
Total, all criteria	100

on public health and safety, and availability of local resources to implement the technologies on a long-term continuing basis.

Numerical Scoring System. The numerical scoring system for rating the alternatives in the Phase II evaluation will be similar to that described above for the Phase I evaluation. The Phase II numerical scoring system is briefly summarized below.

Technology Rating. All of the technologies passing the Phase I screening evaluation will have the potential to contribute to satisfying the objectives of the Settlement Agreement for protection of the Everglades. However, each technology will also have positive and negative features associated with it. The Phase II evaluation criteria are designed to identify those features and to quantify them where it is possible to do so.

The description of each criterion includes a range of conditions and characteristics, both positive and negative, and a proposed rating to be assigned accordingly. The ratings range from "10" for the most positive or favorable condition to "1" for the least positive or favorable condition. The ranges of conditions and proposed ratings are included with the descriptions of the individual Phase II evaluation criteria in Chapter 4.

Criteria Weighting. As noted above, assigning weights to individual evaluation criteria is a way to reflect the importance of one criterion in relation to the others. For the Phase II evaluation, a total of 100 weighting points are assigned to the evaluation criteria. This total is distributed among criteria categories and individual criteria in proportion to their estimated importance to identification of the most attractive technologies.

The weighting points for each Phase II criterion are listed in Table 2-2. Performance criteria and economic criteria are judged to be the most important categories of criteria and are estimated to be approximately equal in relation to one another. These two categories of criteria make up over 70 of the 100 criterion weighting points available. This is appropriate since meeting performance objectives at reasonable cost is a primary purpose of the alternatives evaluation. Environmental and other criteria are judged to be of lesser importance in the evaluation process. However, many aspects of these criteria are also reflected in the performance and economic criteria which have greater weights associated with them.

Analysis of Technology Ratings. The ratings given to the alternative technologies for each scale of application will be reviewed and analyzed for the purpose of making recommendations for further site-specific investigations. Technologies rated highest for treatment of waste streams at the basin scale will be recommended for consideration in the SWIM Plan as system alternatives in combination with on-farm BMPs. Technologies rated highest for treatment of waste streams from farms and point sources will be recommended for combination with other treatment technologies and BMPs, as appropriate, to provide comparable system alternatives (mixes of technologies) which can also be considered for the SWIM Plan.

EVALUATION OF BEST MANAGEMENT PRACTICES

The University of Florida Institute of Food and Agricultural Sciences (IFAS) has developed a series of Best Management Practices (BMPs) for controlling drainage from farms in the Everglades Agricultural Area (EAA). The SWIM Plan for protection of the Everglades assumes that phosphorus discharges from the EAA will be reduced by 25 percent, primarily as a result of on-farm BMPs. The Florida Sugar Cane League (FSCL) believes that a much higher percentage reduction can be achieved with BMPs and that the cost of treatment facilities can be reduced if BMPs are conscientiously practiced throughout the EAA. To this end, the FSCL has also developed a series of potentially applicable BMPs, some of which are refinements to the approaches developed by IFAS.

Evaluation Criteria

The evaluation of BMPs, to be conducted in conjunction with the Phase I and Phase II evaluation of treatment alternatives, will focus on phosphorus removal capability and estimated cost. Discussions will be held with IFAS and FSCL investigators to understand the assumptions and methods used in estimating the capability of an individual BMP to reduce phosphorus discharges. Where different assumptions or methodologies were used, performance and cost projections will be normalized to allow valid comparisons to be made between BMPs.

Once all of the BMPs have been identified and reviewed, they will be evaluated against a series of criteria. The criteria to be used in the evaluation of BMPs will consist of the following:

- Phosphorus reduction capability (as a percentage of base year discharge)
- Total cost per pound of phosphorus removed
- Technical feasibility
- Reliability

Estimates of phosphorus reduction capability have previously been made by IFAS and the FSCL as part of the BMP development process. However, cost estimates for widespread application of the BMPs have not been prepared. Therefore, a key factor in the BMP evaluation will be the development of unit cost factors (per acre for different levels of phosphorus removal) that can be used to compare alternative BMPs and to compare BMPs with treatment technologies on a performance and cost basis.

Analysis of Evaluation Results

The results of the BMP evaluation will be used to identify those BMPs which are both feasible and reliable and which can significantly reduce phosphorus discharges from the EAA at reasonable cost, either individually or in combination with one another. These BMPs will be recommended for detailed evaluation in combination with treatment alternatives for possible incorporation into the SWIM Plan. Other BMPs, felt to be less feasible and reliable or too costly for widespread implementation, will remain optional as possible FTAs. However, their phosphorus reduction capability will not be factored into the analysis of treatment alternatives for the SWIM Plan during this study.

CHAPTER 3

PHASE I TREATMENT TECHNOLOGY EVALUATION CRITERIA

CHAPTER 3

PHASE I TREATMENT TECHNOLOGY EVALUATION CRITERIA

This section presents the criteria to be used in the initial Phase I evaluation of alternative treatment technologies. The Phase I criteria are to be used to evaluate the technologies with respect to their potential applicability for implementation at the basin, subbasin, and individual farm scales, as well as point source treatment methods. They are also to be used in evaluating the capability of the technologies to remove 25, 50 and 75 percent of the influent phosphorus expected for each of those applications. The results of the Phase I evaluation will allow the most applicable technologies at each scale of implementation to be identified as input to the Phase II evaluation.

The Phase I evaluation criteria are intended to focus on the capability of the alternatives to satisfy the objectives of the current SWIM Plan as adopted by the South Florida Water Management District (SFWMD). Weights of 1, 2 and 3 are assigned to the criteria depending on whether they are a primary or secondary goal of the SWIM Plan. Total phosphorus removal capability is given a weight of 3 because the ultimate goal of the SWIM Plan is to reduce total phosphorus load to the Everglades Protection Area. Each alternative will be rated on a scale of 1 to 10 against each criterion. The multiplication of rating times weighting factor yields the score for an alternative against the criterion. Summation of the individual criterion scores yields the total score for an alternative.

Figure 3-1 is a summary rating sheet for the Phase I evaluation of alternative treatment technologies. Following the figure are one-page descriptions of the Phase I evaluation criteria. Each description includes the criterion weighting, the range of conditions or characteristics to be used in rating the technologies, and a discussion of how the criterion should be applied. For many criteria, the range of conditions or characteristics for evaluation of treatment technologies cannot be defined quantitatively. In some of these cases, the current SWIM Plan can be used as a reference standard, or Base Case Alternative, to allow a comparative evaluation to be made. As the alternative technologies become better defined during the investigation process, refinement of the guidelines for rating them against the various criteria will be possible.

Figure 3-1 Summary Rating Sheet for Phase I Technology Evaluation

Criterion	Criterion weighting[a]	Scale of application/level of phosphorus reduction[b]											
		Drainage basin			Sub-basin			Individual farm			Point source		
		25	50	75	25	50	75	25	50	75	25	50	75
Phosphorus removal capability	3												
Implementation schedule	2												
Hydroperiod impact	2												
Operational impact on C & SF Project	2												
Permitting requirements	2												
Previous application of technology	2												
Capital cost	1												
O&M requirements	1												
Economic Impacts	1												
Total													

[a] Criteria directly related to satisfying provisions of SWIM Plan receive a weighting of 2 or 3; all other criteria receive a weighting of 1.

[b] Phosphorus reduction levels of 25, 50 and 75 percent of the influent phosphorus estimated for each scale of application.

PHASE I EVALUATION CRITERIA

Criterion: Phosphorus Removal Capability

Criterion Weighting: 3

Range of Acceptability for Technology Rating

Description	Recommended rating
Proposed technology capable of reducing phosphorus loads by required percentage on a consistent (monthly average) basis.	8-10
Proposed technology capable of reducing phosphorus loads by required percentage on a yearly average basis.	5-7
Proposed technology marginally capable of reducing phosphorus loads by required percentage.	1-4

Criterion Discussion: The SWIM Plan requires that discharges to the Everglades Protection Area reduce the total phosphorus load on an average annual basis. This criterion measures the capability of the technologies to satisfy this important performance objective. Technologies have different demonstrated capabilities to achieve phosphorus levels depending on the total load reduction desired. Those technologies which reduce TP on a consistent basis rate higher against this criterion than technologies that cannot achieve such phosphorus reduction consistently.

PHASE I EVALUATION CRITERIA

Criterion: Implementation Schedule

Criterion Weighting: 2

Range of Acceptability for Technology Rating

Description	Recommended rating
All elements of alternative implementable prior to 1997.	8-10
All elements of alternative implementable by 1997.	5-7
Minor elements of alternative not implementable by 1997.	3-4
Major elements of alternative not implementable by 1997.	1-2

Criterion Discussion: The SWIM Plan stipulates that interim phosphorus loads to the Everglades Protection Area be attained by July 1, 1997. This criterion evaluates the capability of a technology to achieve this objective by assessing when the various project elements can be realistically brought on-line. Technologies that can be implemented quickly and placed into operation prior to the 1997 deadline rate higher than those that cannot.

PHASE I EVALUATION CRITERIA

Criterion: Hydroperiod Impact

Criterion Weighting: 2

Range of Acceptability for Technology Rating

Description	Recommended rating
Implementation of technology results in significant improvement to the quantity, timing and distribution of flows entering the EPA.	9-10
Implementation of technology results in an improvement to flows entering the EPA.	7-8
Implementation of technology results in no changes to flows entering the EPA.	5-6
Implementation of technology results in significant seasonal decreases to flows entering the EPA.	3-4
Implementation of technology results in significant year-round decreases to flows entering the EPA.	1-2

Criterion Discussion: The quantity, distribution, and timing of water flow to the Everglades Protection Area (EPA) is critical to maintaining and restoring native floral and faunal communities. The SWIM Plan requires that actions be taken to restore suitable hydroperiod in the EPA in conjunction with measures to reduce phosphorus loads. This criteria measures the capability of a technology to maintain hydroperiod in the EPA.

PHASE I EVALUATION CRITERIA

Criterion: Operational Impact on C & SF Project

Criterion Weighting: 2

Range of Acceptability for Technology Rating

Description	Recommended Rating
Alternative results in no significant changes to the operational plan for C & SF Project.	8-10
Alternative results in minimal changes to operational plan for C & SF Project.	4-7
Alternative requires congressional action to implement.	1-3

Criterion Discussion: This criterion measures the degree of impact an alternative has on the facilities and goals of the Army Corps of Engineer's Central & South Florida Project. Some Alternatives may impact flood protection and/or water supply goals of the Project. Significant impacts on the goals of the C & SF Project may require Congressional action.

PHASE I EVALUATION CRITERIA

Criterion: Permitting Requirements

Criterion Weighting: 2

Range of Acceptability for Alternative Rating

Description	Recommended rating
Implementation of technology requires permits related only to the initial construction of improvements.	8-10
Implementation of technology requires permits related to initial construction of improvements and Florida DER operating permits.	5-7
Implementation of technology requires permits related to initial construction of improvements, Florida DER operating permits and USEPA operating permits (NPDES).	3-4
Implementation of technology requires a waiver or exemption from existing regulations.	1-2

Criterion Discussion: This criterion measures the anticipated regulatory permitting requirements of a technology. Some technologies will require construction permits only, while others will probably require operating permits. In a few cases, waivers or exemptions from existing regulations might be required in order to implement a technology. Technologies requiring only construction permits are the most preferable with respect to this criterion. Technologies that require operating permits are less desirable because of the ongoing regulatory monitoring and compliance activities that must be accomplished. Technologies that require waivers or exemptions are the least desirable from a permitting perspective. In assigning ratings to technologies, the anticipated difficulty in obtaining permits should also be considered. Therefore, a technology that requires few permits that are difficult to obtain could receive a lower rating than a technology that requires a greater number of permits that are easier to obtain.

PHASE I EVALUATION CRITERIA

Criterion: Previous Application of Technology

Criterion Weighting: 2

Range of Acceptability for Technology Rating

Description	Recommended rating
Technology has been successfully applied at full scale for treatment of stormwater or agricultural drainage.	10
Technology has been successfully applied at full scale in water and wastewater treatment applications.	7-9
Technology has been successfully field tested at full scale for the treatment of stormwater or agricultural drainage.	5-6
Technology has been demonstrated through pilot testing in the field.	3-4
Technology has been demonstrated at bench scale in the laboratory.	1-2

Criterion Discussion: Few, if any, treatment technologies have been applied to stormwater or agricultural drainage at sizes and loading rates comparable to those required by the SWIM Plan for protection of the Everglades. However, some technologies have been used in similar full scale applications while some are just now being researched in the laboratory prior to field testing. It is important that the treatment technologies to be implemented have documented evidence that they will be successful in satisfying the performance objectives of the SWIM Plan. Technologies with successful previous applications at full scale on stormwater or agricultural drainage will have the best documented evidence and, therefore, will rate the highest against this criterion.

PHASE I EVALUATION CRITERIA

Criterion: Capital Cost

Criterion Weighting: 1

Range of Acceptability for Technology Rating

Description	Recommended rating
Capital cost lower than the Base Case Alternative in the current SWIM Plan.	6-10
Capital cost of the Base Case Alternative.	5
Capital cost alternative higher than the Base Case Alternative.	1-4

Criterion Discussion: The estimated capital cost for construction of the alternative treatment technologies, including land purchase, design, equipment, materials for construction, etc., will be compared to the capital cost for the Base Case Alternative. Technologies with the lowest capital costs will be rated highest, while technologies with the highest capital costs will be rated the lowest.

PHASE I EVALUATION CRITERIA

Criterion: Operation and Maintenance Requirements

Criterion Weighting: 1

Range of Acceptability for Technology Rating

Description	Recommended rating
Operation and maintenance requirements less than the Base Case alternative in the current SWIM Plan.	9-10
Operation and maintenance requirements similar to those of the Base Case alternative.	8
Operation and maintenance requirements greater than the Base Case alternative.	1-7

Criterion Discussion: This criterion measures the degree of knowledge and effort necessary to properly operate and maintain the conveyance, storage and treatment facilities proposed for an alternative technology. Factors to be considered include total labor requirements, degree of operator training and certification (if any) required, diversity of skills required, specialized machinery or equipment required, degree of regulatory monitoring and reporting required, and sensitivity of treatment performance to a proper operation and maintenance program.

PHASE I EVALUATION CRITERIA

Criterion: Economic Impacts

Criterion Weighting: 1

Range of Acceptability for Technology Rating

Description	Recommended rating
Total farm land area required:	
Less than 500 acres	10
500 to 25,000 acres	8
25,000 to 45,000 acres	6
45,000 to 65,000 acres	4
65,000 to 85,000 acres	2
Greater than 85,000 acres	1

Criterion Discussion: This criterion uses private land area requirements to measure the economic impact that the various technologies will have on the EAA and the Lower East Coast. As a screening tool the economic impact is based on a linear relationship beginning with 500 acres.

CHAPTER 4

PHASE II TREATMENT TECHNOLOGY EVALUATION CRITERIA

CHAPTER 4

PHASE II TREATMENT TECHNOLOGY EVALUATION CRITERIA

This chapter presents the criteria to be used in the Phase II comparative evaluation of alternative treatment technologies. As discussed in Chapter 2, these criteria are divided into four categories: performance, economic, environmental, and other criteria. Weights are assigned to each criterion to reflect their relative importance and each technology will be rated on a scale of 1 to 10 against each criterion. The multiplication of technology rating times weighting factor yields the score for a technology against the criterion. Summation of the individual criterion scores yields the total score for the technology. Independent evaluations of technologies will be performed at each scale of application (basin, subbasin, farm and point source).

The following pages provide descriptions of each Phase II evaluation criterion. Each description includes the criterion weighting, the range of conditions or characteristics to be used in rating the technologies, and a discussion of how the criterion should be applied. For many criteria, the range of conditions or characteristics for evaluation of alternatives cannot be defined quantitatively. In some of these cases, the current SWIM Plan can be used as a reference standard, or Base Case Alternative, to allow a comparative evaluation to be made. As the alternatives become better defined during the investigation process, refinement of the guidelines for rating them against the various criteria will be possible.

PHASE II EVALUATION CRITERIA

Criteria Category: Performance

Criterion: Phosphorus Removal Capability[a]

Criterion Weighting: 10 points (total = 100 points)

Range of Acceptability for Technology Rating

Description	Recommended rating
Proposed technology capable of reducing phosphorus loads by required percentage on a consistent (monthly average) basis.	8-10
Proposed technology capable of reducing phosphorus loads by required percentage on a yearly average basis.	5-7
Proposed technology marginally capable of reducing phosphorus loads by required percentage.	1-4

Criterion Discussion: The SWIM Plan requires that discharges to the Everglades Protection Area reduce the total phosphorus (TP) load on an average annual basis. This criterion measures the capability of the technologies to satisfy this important performance objective. Technologies have different demonstrated capabilities to achieve phosphorus levels depending on the total load reduction desired. Those technologies which reduce TP on a consistent basis rate higher against this criterion than technologies that cannot achieve such phosphorus reduction consistently.

[a] The phosphporus removal objective for each of the specified waste streams to be considered in the Phase II evaluation will be determined following completion of the Phase I evaluation.

PHASE II EVALUATION CRITERIA

Criteria Category: Performance

Criterion: Implementation Schedule

Criterion Weighting: 8 points (total = 100 points)

Range of Acceptability for Technology Rating

Description	Recommended rating
All elements of alternative implementable prior to 1997.	8-10
All elements of alternative implementable by 1997.	5-7
Minor elements of alternative not implementable by 1997.	3-4
Major elements of alternative not implementable by 1997.	1-2

Criterion Discussion: The SWIM Plan stipulates that interim phosphorus concentrations to the Everglades Protection Area be attained by July 1, 1997. This criterion evaluates the capability of a technology to achieve this objective by assessing when the various project elements can be realistically brought on-line. Technologies that can be implemented quickly and placed into operation prior to the 1997 deadline rate higher than those that cannot.

PHASE II EVALUATION CRITERIA

Criteria Category: Performance

Criterion: Hydroperiod Impact

Criterion Weighting: 6 points (total = 100 points)

Range of Acceptability for Technology Rating

Description	Recommended rating
Implementation of technology results in significant improvement to the quantity, timing and distribution of flows entering the EPA.	9-10
Implementation of technology results in an improvement to flows entering the EPA.	7-8
Implementation of technology results in no changes to flows entering the EPA.	5-6
Implementation of technology results in significant seasonal changes to flows entering the EPA.	3-4
Implementation of technology results in significant year-round changes to flows entering the EPA.	1-2

Criterion Discussion: The quantity, distribution, and timing of water flow to the Everglades Protection Area (EPA) is critical to maintaining and restoring native floral and faunal communities. The SWIM Plan requires that actions be taken to restore suitable hydroperiod in the EPA in conjunction with measures to reduce phosphorus loads. This criteria measures the capability of a technology to maintain hydroperiod to in the EPA.

PHASE II EVALUATION CRITERIA

Criteria Category: Performance

Criterion: Previous Application of Technology

Criterion Weighting: 5 points (total = 100 points)

Range of Acceptability for Technology Rating

Description	Recommended rating
Technology has been successfully applied at full scale for treatment of stormwater or agricultural drainage.	10
Technology has been successfully applied at full scale in water and wastewater treatment applications.	7-9
Technology has been successfully field tested at full scale for the treatment of stormwater or agricultural drainage.	5-6
Technology has been demonstrated through pilot testing in the field.	3-4
Technology has been demonstrated at bench scale in the laboratory.	1-2

Criterion Discussion: Few, if any, treatment technologies have been applied to stormwater or agricultural drainage at sizes and loading rates comparable to those required by the SWIM Plan for protection of the Everglades. However, some technologies have been used in similar full scale applications while some are just now being researched in the laboratory prior to field testing. It is important that the treatment technologies to be implemented have documented evidence that they will be successful in satisfying the performance objectives of the SWIM Plan. Technologies with successful previous applications at full scale on stormwater or agricultural drainage will have the best documented evidence and, therefore, will rate the highest against this criterion.

PHASE II EVALUATION CRITERIA

Criteria Category: Performance

Criterion: Reliability

Criterion Weighting: 3 points (total = 100 points)

Range of Acceptability for Technology Rating

Description	Recommended rating
Higher degree of reliability compared to the Base Case Alternative in the current SWIM Plan.	6-10
Degree of reliability associated with the Base Case Alternative.	5
Lower degree of reliability compared to the Base Case Alternative.	1-4

Criterion Discussion: The reliability of a treatment technology is important to its capability to consistently meet the performance objectives of the SWIM Plan on a long term basis. Factors to be considered in the evaluation of a technology with respect to reliability include (1) provision for back-up treatment capability, if needed; (2) sensitivity to changes in hydrologic conditions; (3) dependence on proper operation and maintenance procedures being performed; (4) dependence on BMPs and FTAs by growers and (5) the number of treatment units proposed for implementation of the technology at the scale of application being considered. For this evaluation, the reliability of a technology is measured against the anticipated reliability of the currently proposed SWIM Plan as the Base Case Alternative.

PHASE II EVALUATION CRITERIA

Criteria Category: Performance

Criterion: Flexibility

Criterion Weighting: 3 points (total = 100 points)

Range of Acceptability for Technology Rating

Description	Recommended rating
Higher degree of flexibility compared to the Base Case Alternative in the current SWIM Plan.	6-10
Degree of flexibility associated with the Base Case Alternative.	5
Lower degree of flexibility compared to the Base Case Alternative.	1-4

Criterion Discussion: This criterion measures the flexibility of a technology in terms of its capability to accommodate future changes in loading rates and/or performance requirements. For example, should the implementation of on-farm BMPs not result in a 25 percent phosphorus reduction and a 20 percent flow reduction, loading rates could be significantly higher or lower than currently anticipated. Furthermore, if the currently proposed phosphorus limit is not sufficient to adequately protect the Everglades, or if nitrogen becomes a factor after phosphorus has been removed, additional treatment may be necessary in the future. Another measure of the flexibility of a technology is the degree to which it can be integrated with other technologies. The flexibility of an alternative reflects its ability to be adapted to changing future conditions to achieve the most cost-effective means of meeting performance objectives. For this evaluation, the flexibility of an alternative is measured against the flexibility of the currently proposed SWIM Plan as the Base Case Alternative.

PHASE II EVALUATION CRITERIA

Criteria Category: Performance

Criterion: Permitting Requirements

Criterion Weighting: 3 points (total = 100 points)

Range of Acceptability for Technology Rating

Description	Recommended rating
Implementation of technology requires permits related only to the initial construction of improvements.	8-10
Implementation of technology requires permits related to initial construction of improvements and Florida DER operating permits.	5-7
Implementation of technology requires permits related to initial construction of improvements, Florida DER operating permits and US EPA operating permits (NPDES).	3-4
Implementation of technology requires a waiver or exemption from existing regulations.	1-2

Criterion Discussion: This criterion measures the anticipated regulatory permitting requirements of a technology. Some technologies will require construction permits only, while others will probably require operating permits. In a few cases, waivers or exemptions from existing regulations might be required in order to implement a technology. Technologies requiring only construction permits are the most preferable with respect to this criterion. Technologies that require operating permits are less desirable because of the ongoing regulatory monitoring and compliance activities that must be accomplished. Technologies that require waivers or exemptions are the least desirable from a permitting perspective. In assigning ratings to technologies, the anticipated difficulty in obtaining permits should also be considered. Therefore, a technology that requires few permits that are difficult to obtain could receive a lower rating than a technology that requires a greater number of permits that are easier to obtain.

PHASE II EVALUATION CRITERIA

Criteria Category: Economic

Criterion: Capital Cost

Criterion Weighting: 10 points (total = 100 points)

Range of Acceptability for Technology Rating

Description	Recommended rating
Capital cost lower than the Base Case Alternative in the current SWIM Plan.	6-10
Capital cost of the Base Case Alternative.	5
Capital cost alternative higher than the Base Case Alternative.	1-4

Criterion Discussion: The estimated capital cost for construction of the alternative treatment technologies, including land purchase, design, equipment, materials for construction, etc., will be compared to the capital cost for the Base Case Alternative. Technologies with the lowest capital costs will be rated highest, while alternatives with the highest capital costs will be rated the lowest.

PHASE II EVALUATION CRITERIA

Criteria Category: Economic

Criterion: Operation and Maintenance Cost

Criterion Weighting: 5 points (total = 100 points)

Range of Acceptability for Technology Rating

Description	Recommended rating
Annual O&M cost lower than the Base Case Alternative in the current SWIM Plan.	6-10
Annual O&M cost of the Base Case Alternative.	5
Annual O&M cost higher than the Base Case Alternative.	1-4

Criterion Discussion: The estimated annual operation and maintenance (O&M) costs for implementation of the alternative technologies will be compared to the annual O&M costs of the Base Case Alternative. O&M costs include: labor, parts, harvesting expenses, chemicals or other materials, replanting, etc. Technologies with the lowest annual O&M costs will be rated the highest, while technologies with the highest O&M costs will be rated the lowest.

PHASE II EVALUATION CRITERIA

Criteria Category: Economic

Criterion: Revenue Loss

Criterion Weighting: 5 points (total = 100 points)

Range of Acceptability for Technology Rating

Description	Recommended rating
Anticipated revenue loss, calculated on a unit basis (e.g. per pound of phosphorus removed) or as an aggregate for a technology; scale of ratings to be determined following definition of alternatives.	1-10

Criterion Discussion: Implementation of the alternative treatment technologies in the Everglades Agricultural Area could result in the loss of revenues from property taxes and the sale of crops. It is anticipated that the magnitude of revenue loss will be directly related to the land area taken out of production. The anticipated revenue loss for each technology will be estimated. Technologies with the highest projected loss of revenue will be rated the lowest while technologies with the lowest projected loss of revenue will be rated the highest.

PHASE II EVALUATION CRITERIA

Criteria Category: Economic

Criterion: Present Worth

Criterion Weighting: 15 points (total = 100 points)

Range of Acceptability for Technology Rating

Description	Recommended rating
Present worth of total costs estimated to be lower than that of the Base Case Alternative in the current SWIM Plan.	6-10
Present worth of total costs for the Base Case Alternative.	5
Present worth of total costs estimated to be higher than that of the Base Case Alternative.	1-4

Criterion Discussion: Present worth will be computed to allow fair comparison of alternatives that may have high capital costs but low annual O&M costs to alternatives with low capital cost but high annual O&M costs. The loss of revenue will also be taken into account in the calculation of present worth. The present worth of the alternatives will be compared against the Base Case Alternative currently included in the SWIM Plan. Technologies with the lowest present worth will be rated highest while technologies with the highest present worth will be rated lowest.

PHASE II EVALUATION CRITERIA

Criteria Category: Environmental Impacts

Criterion: Habitat Value

Criterion Weighting: 6 points (total = 100 points)

Range of Acceptability for Technology Rating

Description	Recommended rating
Increase in habitat value over current conditions.	6-10
No change in habitat value over current conditions.	5
Decrease in habitat value over current conditions.	1-4

Criterion Discussion: Improvement of habitat value in the Everglades is likely to occur with restoration of hydroperiod. Some technologies will impact habitat value in the Everglades Agricultural Area (EAA) more than others as land is taken out of production and used for treatment purposes. This criterion measures the anticipated change a technology would have on habitat value in the EAA as compared with current conditions.

PHASE II EVALUATION CRITERIA

Criteria Category: Environmental

Criterion: Downstream Water Quality

Criterion Weighting: 4 points (total = 100 points)

Range of Acceptability for Technology Rating

Description	Recommended rating
Implementation of technology has potential to enhance downstream water quality.	6-10
Implementation of technology anticipated to have little impact on downstream water quality.	5
Implementation of technology has potential to degrade downstream water quality.	1-4

Criterion Discussion: Reducing phosphorus discharges to the Everglades is a primary objective of the SWIM Plan. Other related water quality issues could also be important to the evaluation of technologies. If only phosphorus is removed from water entering the Everglades, nitrogen could become a problem. If water with high phosphorus concentrations is diverted away from the Everglades, nutrient problems could occur in the Intercostal Waterway. Shifts in water chemistry, and changes in concentrations of trace elements such as heavy metals could also become water quality concerns if some technologies were implemented. This criterion measures the potential for impacts on downstream water quality resulting from implementation of the different treatment technologies.

PHASE II EVALUATION CRITERIA

Criteria Category: Environmental

Criterion: Drinking Water Supply

Criterion Weighting: 4 points (total = 100 points)

Range of Acceptability for Technology Rating

Description	Recommended rating
Anticipated increase in the quantity of water available for drinking water supply.	6-10
No anticipated change in the quantity of water available for drinking water supply.	5
Anticipated decrease in the quantity of water available for drinking water supply.	1-4

Criterion Discussion: It is not anticipated that any of the technologies being considered for protection of the Everglades will have an adverse impact on the quality of water currently used for drinking water supply. However, several of the technologies could have an impact on the quantity of water available to the lower east coast of Florida for water supply purposes. For example, aquifer storage could have beneficial impacts on water supply availability during drought conditions. Conversely, deep well injection takes water away from the aquifer systems which are used for water supply. This criterion measures the impact of a technology on the quantity of water available for drinking water supply, particularly with respect to Florida's lower east coast.

PHASE II EVALUATION CRITERIA

Criteria Category: Environmental

Criterion: Ground and Surface Water Hydrology

Criterion Weighting: 2 points (total = 100 points)

Range of Acceptability for Technology Rating

Description	Recommended rating
Potential for positive impact on local or regional hydrology.	6-10
No anticipated impact on local or regional hydrology.	5
Potential for negative impact on local or regional hydrology.	1-4

Criterion Discussion: Some technologies, such as aquifer storage and to a lesser extent constructed wetlands, have the potential to improve hydrologic conditions. This would be true particularly during drought periods when additional water could be made available to the Everglades. Conversely, some technologies could have adverse impacts on ground or surface water hydrology. To a large extent, these adverse impacts would probably be a function of the area and depth of water in treatment units. Such impacts would probably be most significant on local farms in the form of seepage and elevated groundwater table.

PHASE II EVALUATION CRITERIA

Criteria Category: Environmental

Criterion: Impact on C & SF Project

Criterion Weighting: 1 point (total = 100 points)

Range of Acceptability for Technology Rating

Description	Recommended rating
No significant changes to the operational plan of the C & SF Project.	8-10
Potentially significant but implementable changes to the operational plan of the C & SF project.	4-7
Congressional reauthorization required to implement operational changes.	1-3

Criterion Discussion: The technology (or technologies) implemented must be consistent with the objectives and authorizations of the Central & South Florida (C & SF) Flood Control Project being administered by the U.S. Army Corps of Engineers. Some alternatives may impact the flood protection and/or water supply purposes of the Project. Significant impacts may require Congressional action. This criterion measures the degree to which an alternative impacts the C & SF Project as currently authorized and operated.

PHASE II EVALUATION CRITERIA

Criteria Category: Environmental

Criterion: Energy Utilization

Criterion Weighting: 1 point (total = 100 points)

Range of Acceptability for Technology Rating

Description	Recommended rating
Anticipated energy utilization below that of the Base Case Alternative.	6-10
Energy utilization of the Base Case Alternative.	5
Anticipated energy utilization in excess of the Base Case Alternative.	1-4

Criterion Discussion: The SWIM Plan, as currently proposed, will require significant pumping of flows to, and possibly from, the STAs. Energy utilization, while not a critical factor, is still an important consideration in the evaluation of technologies. This criterion measures the anticipated energy utilization of a technology compared against the current SWIM Plan as the Base Case Alternative.

PHASE II EVALUATION CRITERIA

Criteria Category: Environmental

Criterion: Cultural and Archeological Resources

Criterion Weighting: 1 point (total = 100 points)

Range of Acceptability for Technology Rating

Description	Recommended rating
No impact on cultural or archeological resources anticipated.	10
Impact on cultural or archeological resources possible, but not probable.	5-9
Impact on cultural or archeological resources probable.	1-4

Criterion Discussion: The probability of significant cultural or archeological resources being found intact on agricultural lands is very low. Consequently, the potential for treatment projects constructed in the EAA to impact such resources is also very low. However, the history of Indian culture in south Florida and the presence of Indian reservations to the south and west of the EAA suggests that potential impacts on cultural and archeological resources should be included in the technologies evaluation process. This criterion measures the potential of a technology to impact cultural and archeological resources based on published results of field surveys previously conducted in the vicinities of the EAA and the EPA.

PHASE II EVALUATION CRITERIA

Criteria Category: Environmental

Criterion: Construction Impacts

Criterion Weighting: 1 points (total = 100 points)

Range of Acceptability for Technology Rating

Description	Recommended rating
Anticipated land area disturbed:	
Less than 5,000 acres	10
5,000 to 10,000 acres	8
10,000 to 20,000 acres	6
20,000 to 30,000 acres	4
30,000 to 50,000 acres	2
Greater than 50,000 acres	1

Criterion Discussion: Construction of treatment units at the scale proposed for protection of the Everglades will require clearing of large land areas. In addition to the loss of sediments containing high concentrations of nutrients, there could be a significant release of phosphorus to the Everglades if soils are drained and then allowed to refill. This criterion assumes that the land area disturbed, and therefore able to contribute to short-term releases of nutrients into the Everglades, is directly proportional to the total land required for implementation of a technology. The larger the area of land disturbance, the greater the potential for short-term nutrient impacts downstream.

PHASE II EVALUATION CRITERIA

Criteria Category: Other

Criterion: Land Area Requirements

Criterion Weighting: 2 points (total = 100 points)

Range of Acceptability for Technology Rating

Description	Recommended rating
Total land area required:	
Less than 5,000 acres	10
5,000 to 10,000 acres	8
10,000 to 20,000 acres	6
20,000 to 30,000 acres	4
30,000 to 50,000 acres	2
Greater than 50,000 acres	1

Criterion Discussion: This criterion measures the land area required to implement a technology. Technologies that require less land for water conveyance, storage and treatment functions are preferable to land intensive technologies according to this criterion. The importance of land area requirements to the technology evaluation is reflected not only by this criterion but by several other criteria which also use land area required as the basis for rating.

PHASE II EVALUATION CRITERIA

Criteria Category: Other

Criterion: Operation and Maintenance Requirements

Criterion Weighting: 2 points (total = 100 points)

Range of Acceptability for Technology Rating

Description	Recommended rating
Degree of operation and maintenance required for an alternative to perform successfully; scale of ratings to be determined following definition of alternatives.	1-10

Criterion Discussion: This criterion measures the degree of knowledge and effort necessary to properly operate and maintain the conveyance, storage and treatment facilities required to implement a technology. Factors to be considered include total labor requirements, degree of operator training and certification (if any) required, diversity of skills required, specialized machinery or equipment required, degree of regulatory monitoring and reporting required, and sensitivity of treatment performance to a proper operation and maintenance program.

PHASE II EVALUATION CRITERIA

Criteria Category: Other

Criterion: Employment

Criterion Weighting: 1 point (total = 100 points)

Range of Acceptability for Technology Rating

Description	Recommended rating
Anticipated job loss, calculated on a unit basis (e.g. per pound of phosphorus removed) or as an aggregate for implementation of a technology; scale of ratings to be determined following definition of technologies.	1-10

Criterion Discussion: Loss of jobs will result form agricultural land being taken out of production for use in the Everglades protection project. This criterion measures the impact of implementing a technology on employment as a function of agricultural land area lost to water conveyance, storage and treatment facilities. Technologies resulting in low or modest job loss will receive a high rating against this criterion while alternatives resulting in greater levels of anticipated job loss will receive lower ratings.

PHASE II EVALUATION CRITERIA

Criteria Category: Other

Criterion: Public Health and Safety

Criterion Weighting: 1 point (total = 100 points)

Range of Acceptability for Technology Rating

Description	Recommended rating
Potential beneficial impact on public health and safety.	8-10
No anticipated impact on public health and safety.	7
Potential adverse impact on public health and safety.	1-6

Criterion Discussion: This criterion measures the potential impact of a technology on the general health and safety of the public. Technologies that could increase exposure of the general public to dangerous chemicals, disease, or unsafe conditions would receive a lower rating against this criterion than alternatives that do not. Note, however, that a technology not anticipated to have any significant impact on public health and safety would receive a rating of 7 against this criterion indicating a positive or favorable characteristic.

PHASE II EVALUATION CRITERIA

Criteria Category: Other

Criterion: Local Resource Availability

Criterion Weighting: 1 point (total = 100 points)

Range of Acceptability for Technology Rating

Description	Recommended rating
All resources to implement and operate facilities are available in south Florida.	10
Implementation of technology requires periodic importing of resources or importing of small quantities of resources on a continuing basis.	5-9
Implementation of technology requires importing large quantities of resources on a periodic or continuing basis that are important to the performance of the treatment technologies involved.	1-4

Criterion Discussion: Some technologies require the use of resources or materials that are not available in sufficient quantity in south Florida and must be shipped in from other locations. Examples could include bulk quantities of chemicals, lime rock suitable for sorption treatment processes, species of wetland vegetation required to perform a designated treatment function, etc. This criterion measures the extent to which resources outside south Florida will be needed to construct and operate required treatment facilities, exclusive of mechanical equipment and its ongoing need for maintenance.